5. Jason

Program Name: Jason.java Input File: jason.dat

Jason has been working with parabolas in math class and has asked your programming team to make a program to help him check his homework. He will provide a number of sets of values for coefficients where each set defines a different parabola. For now, all he wants is to know the coordinates of the vertex and whether the parabola opens upward or downward. He provided the following explanation just in case you were not familiar with parabolas.

- Parabolas are the graphical depictions of quadratic functions of the form $f(x) = ax^2 + bx + c$ where the coefficients a, b, and c are real numbers that control the shape and placement of the parabola with $a \neq 0$.
- Parabolas are "bowl" shaped curves if graphed with good scales. The "bowl" opens either upward or downward with the bottom or top of the "bowl" located at the vertex which is the minimum or maximum point of the parabola.
- The vertex of a parabola is found at $x_v = \frac{-b}{2a}$ and its function value is just $f(x_v)$.
- When a > 0 the parabola opens upward and when a < 0 the parabola opens downward.
- First sample below: a = 2, b = 1, and c = 5.
  Vertex is at $\frac{-1}{2\times2} = -0.250$ and $f(-0.250) = 2 \times (-0.250)^2 + 1 \times (-0.250) + 5 = 4.875$

Write a program for Jason to produce a list of vertex coordinates for a given set of parabola coefficients.

Input: First line of data file will contain a count N of the number of sets of coefficients that will follow. The next N lines will contain three whitespace separated decimal values for the coefficients *a*, *b*, and *c*. The maximum range of values for all coefficients will be ±99,999.99 and *a* will never be 0 but the others may be 0.

Output: A list of vertex coordinates in the form `(±99,999.999,±99,999.999)` followed by "`-->`" and the word "UPWARD" or "DOWNWARD" with each parabola on a separate line. Values > 0 will not display a + and there are no intervening spaces.

Sample input:

```
5
2 1 5
-5.3 7.2 -2.6
987.65 -123.45 -543.21
0.03 98.76 -91827.36
-3.1 0.0 0.0
```

Sample output:

```
(-0.250,4.875)-->UPWARD
(0.679,-0.155)-->DOWNWARD
(0.062,-547.068)-->UPWARD
(-1646.000,-173106.840)-->UPWARD
(0.000,0.000)-->DOWNWARD
```